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ABSTRACT

This study investigated relationships among anxiety, self-concept, achievement, sex and I.Q. in two educational settings: a structured formal setting and an open informal setting. A sample of 326 fourth grade students attending schools differing in structure and formality were given the following tests: The California Mental Aptitude Test: the Comprehensive Test of Basic Skills (CTBS): the Test Anxiety Scale for Children (TASC): the General Anxiety Scale for Children (GASC): the Defensive Scale (part of the GASC): and the Coopersmith Self-Esteem Inventory (SEI). Subjects differed significantly on achievement, with those in the formal setting doing better. With IQ as the covariant, however, setting differences were not significant for achievement, anxiety, or self-concept. Sex differences were significant for all variables but self-concept. The achievement of low anxious students was better than that of high anxious students in both settings. Aptitude treatment interaction effects indicated that high IQ students performed better in the formal setting while low IQ students performed better in the informal setting. (Author/SS)

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ACHIEVEMENT, ANXIETY AND SELF-CONCEPT IN FORMAL AND INFORMAL SETTINGS

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Achievement, Anxiety and Self-Concept

in Formal and Informal Settings

The relationship between achievement and anxiety, self-concept, sex and IQ in formal and informal settings is reported. 326 fourth graders differed significantly in favor of the formal setting on achievement. However, significant differences in IQ between the two settings were noted prior to the treatment; with IQ as the covariant, setting was not significant for achievement, anxiety or self-concept. Sex was significant for all variables but self-concept. Low anxious students out achieved highly anxious students in both settings. ATI effects were high IQ students performed better in the formal and low IQ students in the informal setting.

Achievement, Anxiety and Self-Concept
in Formal and Informal Settings

Anxiety as a variable for study in school settings has been of considerable interest in recent years. One reason is that students who are highly anxious generally do not achieve as well as low anxious students. While a relationship has been established between anxiety and achievement, the nature of that relationship is yet to be determined. Researchers have explored affective variables such as anxiety and self-concept in an effort to partial out variance in achievement which has not been accounted for by more academically oriented variables. This study investigates the relationship of anxiety and self-concept with achievement in two educational settings.

Classroom ecology is also a variable receiving attention. The optimum classroom setting for learning has yet to be identified. Open classrooms with informal learning situations have been compared with the more structured formal settings although the number of studies is small. Rosenshine (1977) summarized the studies in elementary settings as indicating that one teacher, self-contained, highly structured classrooms were associated with higher achievement in reading and mathematics as measured on conventional achievement measures than open, informal settings.

The role of anxiety in two educational settings, formal and informal, and the relationship of achievement to anxiety, settings, self-concept, IQ and sex are the variables investigated in this study.

The majority of the studies reporting relationships between anxiety and achievement used high school and college students as subjects. Results from these studies varied according to the types and difficulty of the tasks, IQ, sex and setting (Snow, 1976; Gaudry and Spielberger, 1971).

Aptitude treatment interactions (ATI) were found for some of the variables. Whether these findings hold for elementary school students remains in doubt. Sarason et al (1960) has presented the most comprehensive reporting on elementary level subjects. Other studies, using subjects at the elementary level such as McCandless et al (1956); Castenada et al (1956); Lipsitt (1958); Maccoby and Jacklin (1974), primarily reported descriptive and/or correlational data.

Some of the findings of previous studies which bear on the present investigation are as follows:

Girls score higher on anxiety than boys (Sarason et al, 1960; Maccoby and Jacklin, 1974)

Highly anxious children have lower self-concept than low anxiety children (Lipsitt, 1958)

Highly anxiety children are more cautious and less curious than low anxiety children (Penney, 1965; Sarason et al, 1960).

As test anxiety increases, the level of IQ and mean achievement decreases (Sarason et al, 1960)

Test anxiety is more related to IQ and mean achievement than being a consequence of low intelligence (Sarason et al, 1960).

These results do not answer the questions about the variable in different settings, nor do they indicate the ATI effects reported in the research with older students. For instance, with college students high anxiety facilitated the performance of high IQ students and impaired performance of low IQ students while low anxiety students

of low ability did better than high anxiety students of low ability, and low anxiety students of high ability did poorer than high anxiety students of high ability (Denny, 1966).

The present study was designed to investigate differences in achievement, test anxiety, general anxiety and self-concept of elementary school children in the informal and formal settings.

Questions asked were:

Do children achieve higher in a formal setting than an informal one?

Do low anxious students achieve higher than highly anxious students? Do they have higher self-concepts?

Do girls achieve higher than boys? Are they more anxious than boys?

Do high IQ students differ in anxiety and self-concept over low IQ students?

Are there aptitude treatment interactions operating between the variables?

Method

Sample

The sample was composed of all fourth grade students in three elementary schools in a school district in the Southeast. Most of the students attended feeder schools for K - 3 and were completing their first year in their respective school. There were 326 fourth graders of which 149 were male and 177 female.

Procedure

The dependent variables were achievement, self-concept, general anxiety and test anxiety. The independent variables were setting, IQ and sex.

Students were assigned to the two settings or treatments by virtue of the school they attended. The setting labeled "informal" was classified by the authors and two other observers as low in structure and high in student participation. The classrooms were organized with open space, learning centers and with student choice and movement. Each child had several teaching and departmentalized staff. The "formal" setting was classified as high structure and high participation. The classrooms were self-contained with one teacher. There was extensive seat work and low student choice and movement.

The IQ test (California Mental Aptitude Test) was administered in the spring of the previous year, third grade (3.7). All other instruments were administered in the spring of the year of the study. The items were read to the students in their classrooms by the investigators who administered the two anxiety scales and self-concept inventory. The achievement test and the IQ tests were administered as part of the regular district testing program.

Tests

The California Mental Aptitude Test was the measure of IQ. The Comprehensive Test of Basic Skills (CTBS) was the achievement test. The Test Anxiety Scale for Children (TASC) and the General Anxiety Scale for Children (GASC) and the Defensive Scale (built into the GASC) were the measures of test anxiety, general anxiety and defensiveness, respectively. The Coopersmith Self-Esteem Inventory (SEI) was the measure of self-concept.

Data Analysis

The results were analyzed by computer using the Statistical Analysis System (SAS). Means, standard deviations, correlations, analysis of variance and covariance were computed. The results are divided into four sections. The first section reports the comparisons between formal and informal settings with respect to sex. The correlational analysis follows in the next part. The final section further examines the data by dividing the students into groups by IQ and anxiety.

Results

Comparisons by setting

The analysis of variance revealed significant differences on achievement and general anxiety but no significant differences on test anxiety, defensiveness or self-concept between the formal and informal settings. Students in the formal setting scored significantly higher on achievement, somewhat higher on self-concept and less anxious than those in the informal settings (see Table 1).

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insert Table 1 about here

Differences in IQ scores between the formal (101.36) and informal (92.46) suggest that the children in the two settings were different prior to treatments even though they were drawn from the same geographical area. Therefore, IQ was used as the covariable resulting in no significant differences on any of the variables between the formal and informal settings (see Table 2). These results indicate that IQ, not setting is the

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insert Table 2 about here

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significant factor in the achievement differences.

Comparison by sex

Sex differences have been previously cited from the literature. Table 3 gives means and standard deviations by sex for the total sample and by setting.

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insert Table 3 about here

Sex differences for the total group show girls with higher achievement in language and the CTBS total, higher anxiety scores and less defensiveness (a high score is less defensive than a low score). There is a trend for the variability of girls to be less than that of boys which has been suggested in the literature. In the informal setting the boys scored somewhat higher on IQ but lower on achievement than the girls. Again, girls scored higher on anxiety and lower on defensiveness, but their self-concept score was slightly lower than the boys. For the informal setting there was little difference in IQ between boys and girls. Girls scored higher on language and anxiety and were less defensive than the boys. Again, variability is less for girls than for boys. Maccoby and Jacklin (1974) suggest that the higher anxiety score for girls may be because they are less defensive rather than more anxious than boys.

A two-way analysis of variance by setting and sex revealed significant differences in achievement (by setting), general anxiety (by

settings and sex), test anxiety (by sex) and self-concept (by sex).

In the two way analysis of covariance by setting and sex with IQ as the covariant, there were significant differences in achievement, general anxiety and test anxiety with IQ and sex as the significant variables. There was no significant difference in self-concept.

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insert Table 4 about here

Correlational analysis

Correlations between variables are reported in Table 5.

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insert Table 5 about here

The correlation between the IQ tests given a year earlier and the CTBS is high, .84 for IQ and CTBS total and strongly suggests the treatment was not the significant factor. A modest but significant negative correlation between IQ and both anxiety scales is contrary to Casteneda et al (1956) but consistent with the findings of Sarason et al (1960). Lipsitt (1958) reported a negative correlation between self-concept and anxiety. This held for the test anxiety but not for general anxiety. The lack of relationship between self-concept and both IQ and achievement is interesting and somewhat unexpected. The significant negative correlation between both anxiety scales and achievement is supported by McCandless et al (1956) and Maccoby and Jacklin (1974)

Dichotomizing the sample

To explore the data further for possible ATI effects the sample was dichotomized by IQ, general anxiety and test anxiety.

Comparison by IQ groups

The sample was dichotomized by IQ using the mean for the total sample as the point of separation. This was used along with setting in a two-way analysis of variance. The high IQ group had significantly higher mean achievement than the low IQ group. IQ group was the significant variable, $F_{1,313} = 232.5$; $P < .001$, setting was not significant and the interaction between IQ group and settings approached significance, $F_{1,313} = 3.64$; $P < .057$. It is noted that approximately 60% of the students in the formal setting were in the high IQ group while only 32% of the students in the informal setting were in the high IQ group. The lowest mean score of the high IQ group was well above the highest mean score of the low IQ group.

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insert Figure 1 about here

Comparison by general anxiety groups

The sample was divided into high and low anxiety groups using the mean general anxiety score as the point of separation. This was used along with the setting in a two-way analysis of covariance with the IQ as the covariant. Low anxious students achieved higher than highly anxious students in each setting. The analysis of covariance showed that only IQ accounted for a significant proportion of variation in the achievement scores, $F_{1,262} = 625.61$; $P < .0001$. General anxiety,

setting and the interaction between general anxiety and setting were not significant after IQ was used as the covariant. There was a higher percentage of the more highly anxious students in the informal setting.

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insert Figure 2 about here

Comparison by test anxiety groups

The sample was dichotomized by test anxiety using the mean test anxiety score for the sample as the point of separation. This was used along with setting in a two-way analysis of covariance using IQ as the covariant. Again, low anxious students had higher mean achievement than highly anxious students in both settings and IQ, the covariant, accounted for the significant proportion of variation in the achievement scores, $F_{1,262} = 627.60$; $P < .0001$. There were no significant effects due to test anxiety, setting, or the interaction of test anxiety and setting after IQ was used as the covariant. It is noted that the mean achievement score of the higher test anxiety group in the formal setting is higher than the low test anxiety group in the formal setting.

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insert Figure 3 about here

Although self-esteem was not significantly different when the group was dichotomized by IQ or general anxiety, it was significantly different when the sample was dichotomized by test anxiety, $F_{1,252} = 9.01$; $P < .003$. Test anxiety groups, along with setting were used in a two-way analysis

of covariance using IQ as the covariant. IQ and setting were not significant but the interaction of test anxiety and setting was significant, $F_{1,252} = 8.88$; $P < .003$. In the formal setting the mean self-esteem for the high and low group was about the same. In the informal setting the low anxious group had a higher mean self-esteem than the highly anxious group.

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insert Figure 4 about here

As with the general anxiety and the test anxiety groups on achievement, the proportion of highly anxious students was larger for the informal settings on the self-esteem variables.

Discussion

Of the above figures the results of achievement by IQ groups suggest a trend different from that cited in the literature. High ability students did better in the formal setting than the informal one and low ability students did better in the informal setting than the formal. As noted earlier, however, in the informal setting where the high IQ students did less well than in the formal setting they still scored considerably higher than the low IQ group. That the low IQ group scored 15 points higher on achievement in the informal setting over the formal setting is encouraging. This is contrary to studies which indicate the need for high structure for such students; they fared better in the low structure of the informal setting.

The results of this study confirmed results of previous studies (Sarason et al, 1960; Maccoby and Jacklin, 1974) in which girls scored

higher on anxiety scales than boys. Since the girls are less defensive, they may be admitting to more anxiety rather than being more anxious.

Lipsitt (1958) reported that highly anxious children and lower self-concepts than low anxious children. In the informal setting the present study supports this, however, in the formal setting the self-concept of the two groups was almost identical.

Previously, Sarason et al (1960) concluded that as test anxiety increased, achievement decreased. It is noted that although this might appear to be supported in the present study, when IQ is used as the covariant in comparing high and low anxious groups in the two settings, IQ is the only significant variable.

The correlations between IQ and achievement and the two anxiety scales although significant raise doubt about previously reported relationships (Sarason et al, 1960). The correlations between test anxiety and IQ, and general anxiety and achievement is slightly higher than the correlations between general anxiety and achievement, respectively. All the above correlations were significant.

Children in the informal setting were more anxious than those in the formal setting. Their IQ's and achievement scores were lower also. However, where IQ was used as the covariant, the setting was not the significant factor in these lower scores for the informal setting; only IQ was significant.

One concludes from the present study that the relationship between self-concept and anxiety should be explored further in different kinds of school settings. It further suggests that both formal and informal settings produce learning and that the critical variable is not the setting but the IQ's of the children.

Table 1

Means and Standard Deviations of Variables for Fourth Grade Students
(Standard Deviations in Parentheses)

Variable	Total N=326	Formal N=230	Formal School A N=164	Formal School B N=66	Informal N=99
IQ	98.82 (14.02)	101.36 (13.45)	103.15 (12.97)	96.57 (12.97)	92.46 (13.47)
CBTS: Reading	411.12 (82.17)	418.85 (87.79)	427.62 (89.78)	395.77 (70.18)	392.45 (69.65)
Language	435.29 (57.66)	442.07 (79.85)	447.64 (80.70)	427.23 (76.01)	418.37 (55.33)
Mathematics	388.13 (57.66)	390.50 (58.27)	396.03 (58.74)	375.77 (54.97)	382.23 (56.00)
Total	387.61 (79.28)	395.00 (84.52)	403.25 (87.45)	373.25 (72.88)	369.25 (61.11)
GASC	20.66 (8.50)	20.01 (8.74)	19.92 (8.63)	20.31 (9.08)	22.17 (7.75)
Defensiveness	8.49 (3.02)	8.40 (3.34)	8.46 (3.54)	8.25 (2.67)	8.68 (2.08)
TASC	16.38 (7.19)	15.99 (7.63)	15.83 (7.79)	16.62 (7.19)	17.29 (6.01)
SEI	29.00 (7.08)	29.47 (6.76)	29.11 (6.13)	30.05 (8.97)	27.94 (7.68)

Table 2

Analysis of Convariance Between Formal and Informal Setting Using IQ as the Covarient

	IQ		Setting	
	F	P	F	P
CTBS Total	627.68	.0001*	1.21	.27
GASC	18.42	.0001*	.76	.39
Defensiveness	2.24	.14	1.92	.17
TASC	19.51	.0001*	.14	.71
Self-Esteem	.42	.52	2.46	.12

* Significant P values

Table 3

Means and Standard Deviations of Variables by Sex
for Fourth Grade Students

(Standard Deviations in Parentheses)

	Total		Informal		Formal	
	Boys N=149	Girls N=177	Boys N=50	Girls N=46	Boys N=99	Girls N=131
IQ	99.09 (14.93)	98.56 (13.17)	93.55 (13.05)	91.19 (14.02)	101.71 (15.11)	101.07 (11.93)
CTBS	409.09 (87.91)	412.83 (77.21)	389.40 (67.14)	395.63 (72.78)	418.64 (95.23)	419.01 (78.09)
	424.25 (74.31)	444.78 (73.30)	410.96 (55.80)	426.65 (54.25)	430.70 (81.26)	450.88 (77.91)
	387.99 (60.01)	388.25 (55.76)	378.98 (50.97)	385.86 (61.56)	892.41 (63.75)	389.05 (53.91)
	382.97 (81.44)	391.58 (77.42)	366.44 (62.15)	372.40 (60.51)	391.06 (88.55)	398.02 (81.52)
GASC	16.48 (8.08)	24.18 (7.16)	18.67 (7.89)	25.89 (5.61)	15.34 (7.98)	23.55 (7.58)
Defensive	7.84 (2.53)	9.04 (3.28)	8.31 (2.31)	9.09 (1.75)	7.60 (2.62)	9.02 (3.70)
TASC	15.11 (8.00)	17.45 (6.26)	15.80 (5.91)	18.89 (5.76)	14.77 (8.91)	16.91 (6.37)
SEI	28.77 (6.96)	29.20 (7.19)	28.46 (7.10)	27.39 (8.29)	28.94 (6.92)	29.88 (6.64)

Table 4

Analysis of Covariance Between Formal and Informal Settings and Sex using IQ as the Covariant

	IQ		Sex		Setting		Sex & Setting	
	F	P	F	P	F	P	F	P
CTBS Total	636.22	.0001*	5.06	.03*	1.71	.19	.06	.81
GASC	23.29	.0001*	68.28	.0001*	2.70	.10	.15	.70
Defensiveness	2.30	.13	8.99	.003*	2.73	.10	.20	.66
TASC	19.91	.0001*	7.13	.008*	.03	.87	.30	.58
Self-esteem	.42	.52	.54	.46	2.30	.13	1.12	.29

* significant p values

Table 5

Correlations Between Variables for Fourth Grade Students

N=326

	IQ	CTBS Read	CTBS Lang	CTBS Math	CTBS Total	GASC	Defensive	TASC	Self-Esteem
CTBS Reading	.81[a]								
CBTS Lang	.77[a]	.83[a]							
CTBS Math	.79[a]	.76[a]	.75[a]						
CTBS Total	.84[a]	.91[a]	.87[a]	.86[a]					
GASC	-.26[a]	-.27[a]	-.20[a]	-.18[b]	-.22[a]				
Defen-siveness	.09	.01	.07	.11	.10	.35[a]			
TASC	-.27[a]	-.32[a]	-.26[a]	-.26[a]	-.30[a]	-.44[a]	-.28[a]		
Self-Esteem	.04	-.03	.01	-.01	-.005	-.08	-.18[b]	-.23[a]	

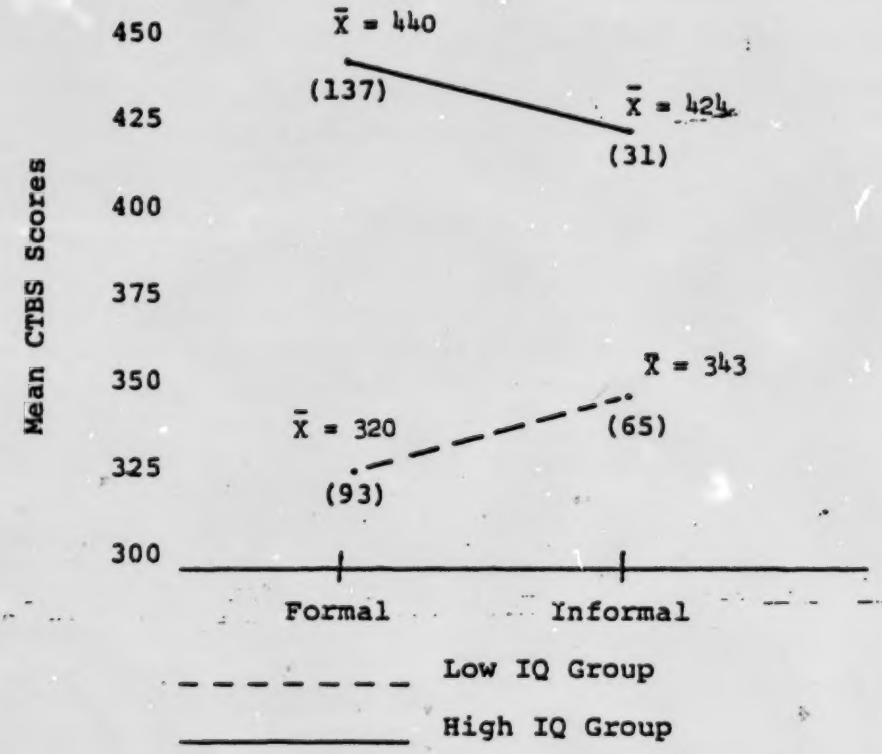
[a] = $p < .001$

[b] = $p < .01$

[c] = $p < .05$

Figure 1

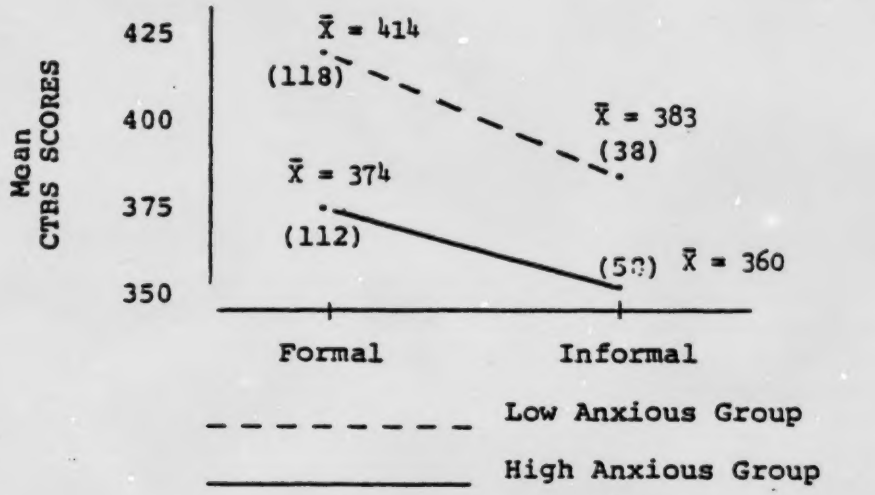
Mean Achievement of Low IQ and High IQ Groups by Setting



N's for each group is in parentheses

Figure 2

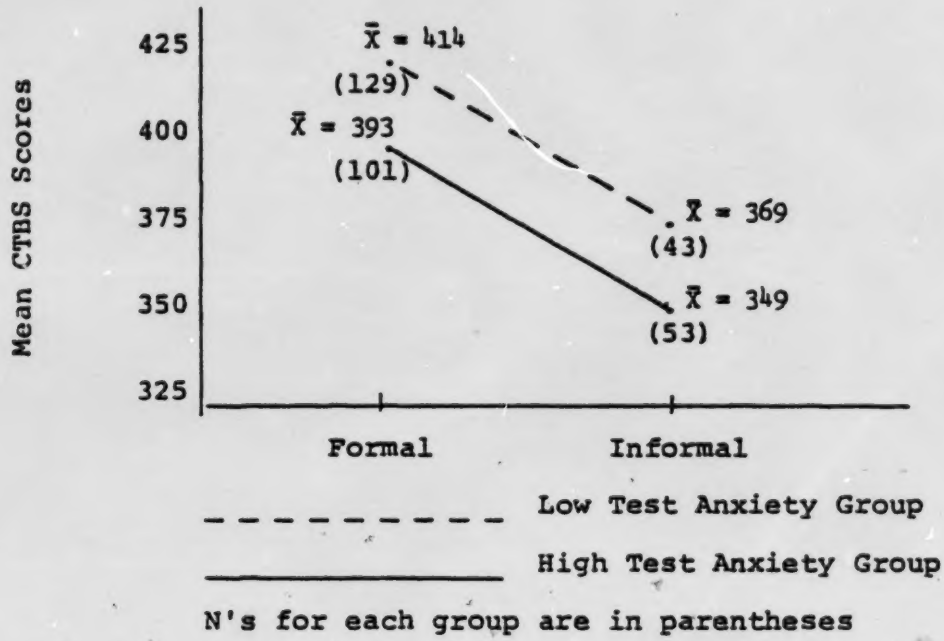
Mean Achievement of Low and High General Anxiety Groups by Setting



N's for each group are in parentheses

Figure 3

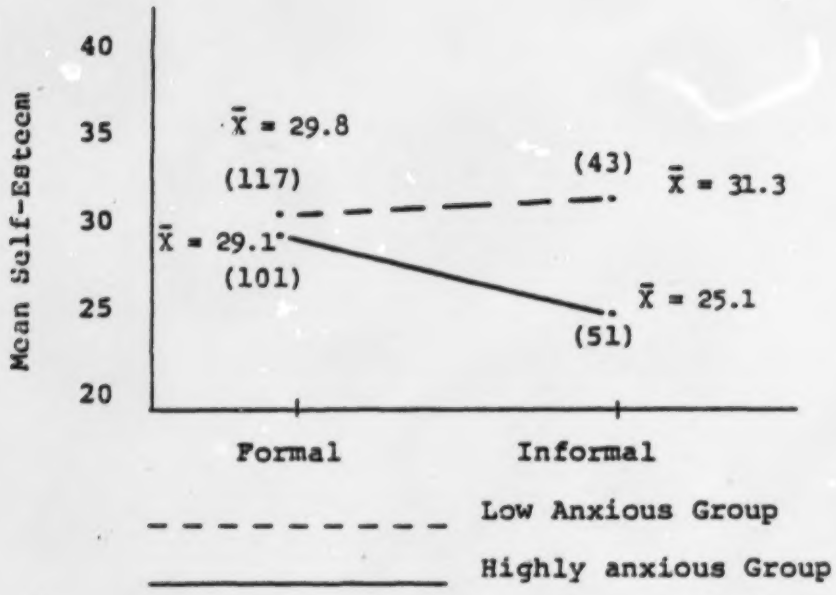
Mean Achievement of Low and High Test Anxiety Groups by Setting



N's for each group are in parentheses

Figure 4

Mean Self-Esteem of Low and High Test Anxiety Groups by Setting



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